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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/532,922	03/22/2000	Bruce Emerson Wilcox	8993/108	8556

7590

04/25/2003

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EXAMINER

LEI, TSULEUN R

ART UNIT

PAPER NUMBER

2681

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/532,922

Applicant(s)

WILCOX ET AL.

Examiner

TSULEUN R. LEI

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-52 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-52 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn. However, upon further consideration, a new ground(s) of rejection is made as follows.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-31 and 39-52 are rejected under 35 U.S.C. 102(e) as being anticipated by Trikha et al. (U.S. Patent 6,072,993).

Regarding Claim 1, Trikha teaches a multiple antenna system, comprising: (a) first and second antennas (Fig.2);(b) first and second signal circuits connected with respective first and second antennas via first and second signal paths (Fig.2);(c) a first parallel tuning circuit connected in parallel with the first signal path, the first tuning circuit adjusting the impedance of the first antenna (Fig.4B, the quarter-wave length line 108, 114 and 128 all are parallel tuning circuit capable of adjusting the impedance of the antenna.).

Regarding Claim 2, Trikha teaches the multiple antenna system of claim 1 further comprising a third antenna connected with a third signal source via a third signal path (It is inherent that Trikha's teaching applies to any number of antennas.).

Regarding Claim 3, Trikha teaches the multiple antenna system of claim 1, wherein the first and second signal circuits are capable of generating electromagnetic signals (Fig.2).

Regarding Claim 4, Trikha teaches the multiple antenna system of claim 3, wherein the electromagnetic signals include radio frequency signals (Fig.2).

Regarding Claim 5, Trikha teaches the multiple antenna system of claim 1, wherein the first and second signal circuits generate signals at unique frequencies (Fig.2).

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Regarding Claim 6, Trikha teaches the multiple antenna system of claim 1, wherein the first and second signal circuits generate signals at the same frequencies (Fig.2).

Regarding Claim 7, Trikha teaches the multiple antenna system of claim 1, wherein the first and second antennas are fabricated on a common dielectric material (It is inherent that high frequency antennas can be made on a common dielectric material.).

Regarding Claim 8, Trikha teaches the multiple antenna system of claim 1, further comprising an antenna housing capable of housing at least the first and second antennas (It is inherent that a number of small antennas can be housed together in a common antenna housing.).

Regarding Claim 9, Trikha teaches the multiple antenna system of claim 1, wherein the second signal circuit is capable of generating signals in. multiple frequency bands (Fig.2).

Regarding Claim 10, Trikha teaches the multiple antenna system of claim 9, wherein the first parallel tuning circuit increases the electromagnetic isolation between the first and second antennas in multiple frequency bands (Fig.4, Cellular and PCS bands).

Regarding Claim 11, Trikha teaches the multiple antenna system of claim 1, wherein the first parallel tuning circuit includes an impedance matching circuit (Fig.4, quarter-wave lines 108, 114 and 128).

Regarding Claim 12, Trikha teaches the multiple antenna system of claim 11, wherein the impedance matching circuit matches an impedance of the second antenna via electromagnetic coupling with the first antenna (Fig.4B).

Regarding Claim 13, Trikha teaches the multiple antenna system of claim 11, wherein the impedance matching circuit matches an impedance of the second antenna (Fig.4B).

Regarding Claim 14, Trikha teaches the multiple antenna system of claim 11, wherein the first tuning circuit includes a plurality of impedance matching circuits, each impedance matching circuit being independently selectively connectable in parallel to the first signal path (Figs.1-4).

Regarding Claim 15, Trikha teaches the multiple antenna system of claim 1 further comprising: (d) a second parallel tuning circuit selectively connectable in parallel to the second signal path (Fig.3B, 110, 112 and 126).

Regarding Claim 16, Trikha teaches the multiple antenna system of claim 15, wherein the second parallel tuning circuit increases the electromagnetic isolation (Figs.1-4) between the first and second antenna.

Regarding Claim 17, Trikha teaches the multiple antenna system of claim 1, wherein the first tuning circuit is selectively connectable to the first signal path near the first antenna (Fig.4B).

Regarding Claim 18, Trikha teaches the multiple antenna system of claim 1, wherein the first tuning circuit creates an impedance at an input of the first antenna substantially equivalent to an open circuit at the transmission frequency of the second antenna (Figs.3B and 4B).

Regarding Claim 19, Trikha teaches the multiple antenna system of claim 1, wherein the first parallel tuning circuit includes a plurality of band tuning circuits, each band tuning circuit being independently selectively connectable with the first signal path (Figs.1-4).

Regarding Claim 20, Trikha teaches the multiple antenna system of claim 19, wherein each band tuning circuit creates a different impedance at an input to the first antenna associated with the connection to the first signal circuit (Figs.1-4).

Regarding Claim 21, Trikha teaches the multiple antenna system of claim 19, wherein the first tuning circuit includes a first band tuning circuit having an impedance matched to the second antenna and a second band tuning circuit having an impedance matched to a third antenna (Figs.1-4).

Regarding Claim 22, Trikha teaches the multiple antenna system of claim 19, wherein the first parallel tuning circuit comprises an adjustable impedance based on selectively connecting different ones of the plurality of band tuning circuits with the first signal path (Col.2, Lines 12-25).

Regarding Claim 23, Trikha teaches the multiple antenna system of claim 19, further comprising a detector to control selective connection of individual ones of the plurality of band tuning circuits with the first signal path (Col.2, Lines 12-25).

Regarding Claim 24, Trikha teaches the multiple antenna system of claim 1, wherein the first signal source includes a radio transceiver (Fig.2).

Regarding Claim 25, Trikha teaches the multiple antenna system of claim 1, wherein the multiple antenna system is adaptable for use in a cellular telephone (Fig.2).

Regarding Claim 26, see Claim 1 for Trikha's teaching.

Regarding Claim 27, see Claims 1, 15 and 16 for Trikha's teaching.

Regarding Claim 28, see Claim 13 for Trikha's teaching.

Regarding Claim 29, see Claim 19 for Trikha's teaching.

Regarding Claim 30, see Claim 19 for Trikha's teaching.

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Regarding Claim 31, Trikha teaches the parallel tuning circuit of claim 30, wherein the selectable impedance is digitally selectable (Col.2, Lines 35-36, PIN diodes switch).

Regarding Claim 39, see Claims 1 and 16 for Trikha's teaching.

Regarding Claim 40, see Claim 9 for Trikha's teaching.

Regarding Claim 41, see Claim 10 for Trikha's teaching.

Regarding Claim 42, see Claim 11 for Trikha's teaching.

Regarding Claim 43, see Claim 12 for Trikha's teaching.

Regarding Claim 44, see Claim 14 for Trikha's teaching.

Regarding Claim 45, see Claim 15 for Trikha's teaching.

Regarding Claim 46, see Claim 16 for Trikha's teaching.

Regarding Claim 47, see Claim 18 for Trikha's teaching.

Regarding Claim 48, see Claim 19 for Trikha's teaching.

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Regarding Claim 49, see Claim 20 for Trikha's teaching.

Regarding Claim 50, see Claim 21 for Trikha's teaching.

Regarding Claim 51, see Claim 19 for Trikha's teaching.

Regarding Claim 52, see Claim 23 for Trikha's teaching.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 32-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Trikha in view of Michaels et al. (U.S. Patent 4,549,312).

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Regarding Claim 32, Trikha teaches the parallel tuning circuit of claim 30, wherein first impedance matching circuit dynamically adjusts impedance of the antenna. Trikha fails to teach that the purpose of antenna impedance adjustment is to reduce the external interference. Michaels teaches that the antenna impedance adjustment is based on external interference (Michaels, Col.1, Lines 36-44). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Michaels to the teaching of Trikha to extend the application of antenna tuning and matching to also include the interference cancellation by using the same techniques taught by Trikha.

Regarding Claim 33, Trikha as modified by Michaels teaches a method of adjusting impedance in a multiple antenna system, comprising: (a) detecting whether a first signal source connected with a first antenna via a first signal path is active or inactive (Michaels, Col.1, Lines 36-44, the center frequency of the receiver); (b) detecting whether a second signal source (Michaels, Col.1, Lines 36-44, the presence of the undesired narrow band signals), connected with a second antenna via a second signal path is active or inactive, wherein the second antenna is proximate to the first antenna; and (c) selectively connecting a first parallel impedance circuit in parallel with the first signal path based on the active or inactive states of the first and second signal sources (Michaels, Col.1, Lines 36-44, varies the center frequency).

Regarding Claim 34, Trikha as modified by Michaels teaches the method of claim 33, further comprising: (d) measuring external interference proximate to the first antenna (Michaels,

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Col.1, Lines 64-68); and (e) adjusting the impedance of the first parallel impedance circuit based on the external interference (Michaels, Col.1, Lines 64-68).

Regarding Claim 35, see Claims 1 and 21 for Trikha's teaching.

Regarding Claim 36, see Claim 17 for Trikha's teaching.

Regarding Claim 37, see Claims 15 and 16 for Trikha's teaching.

Regarding Claim 38, see Claim 17 for Trikha's teaching.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Francisco et al. (U.S. Patent 6,256,495)

Jovanovich et al. (U.S. patent 6,005,530)

Matero et al. (U.S. Patent 6,115,585)

Rosenberg et al. (U.S. patent 5,842,117)

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to TSULEUN R. LEI whose telephone number is 703-305-4828. The examiner can normally be reached on 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dwayne Bost can be reached on 703-305-4778. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-5403 for regular communications and 703-308-5403 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

TRL

TRL
April 16, 2003


ERIKA GARY
PATENT EXAMINER